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AUTHOR Levin, Joel R.; Pressley, Michael
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ABSTRACT

Prose-learning strategies are classified in this paper as prose-dependent (those that authors can use to optimize communication) or processor-dependent (those that learners can use to optimize reception) and are cross-classified as stage-setting (those that prepare the learner for upcoming prose information) or storage-retrieval oriented (those that can be brought into play during passage presentation). In the main section of the paper, selected strategies that seem to hold promise for improving children's prose learning are described, and supporting research examples are presented, for the following categories: prose-dependent, stage-setting strategies; processor-dependent, stage-setting strategies; prose-dependent, storage/retrieval strategies; and processor-dependent, storage/retrieval strategies. It is concluded that, in order to be effective, prose-learning strategies require clever delivery on the part of an instructor (including the matching of strategies to materials and students) and conscientious application on the part of the student. (GW)

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Theoretical Paper No. 72

# IMPROVING CHILDREN'S PROSE COMPREHENSION: SELECTED STRATEGIES THAT SEEM TO SUCCEED

by

Joel R. Levin and Michael Pressley

Report from the Project on
Studies in Language: Reading and Communication

Joel R. Levin
Faculty Associate

Wisconsin Research and Development
Center for Individualized Schooling
The University of Wisconsin
Madison, Wisconsin

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While struggling to find just the right words to communicate what this chapter is about, we came across Gordon Bower's introductory remarks in a recent article on what it takes to understand a story. Since his words reflect our thoughts, we will apply the "law of least effort" and simply reproduce them here:

> Let us begin with the familiar observation that texts we read differ a tremendous amount in their comprehensibility and in their memorability. In fact, some are so difficult that the only memorable thing about them is how incomprehensible they were. I recall taking a literature course in college where we read James Joyce's *Finnegan's Wake* [sic][1]; although I enjoyed the flow of words and images, I could not remember enough about what I had read in order to discuss it when I went to class the next day. The same is true today if I read experimental-fiction writers such as John Hawkes. The language and imagery is often stunning and beautiful, but I barely remember enough to know where to pick up my reading again in case I lose my bookmark. One might attribute all this to my poor memory. But on the other hand, I find I have very good memory for adventure stories and folktales, for stories like those in *Canterbury Tales*, *The Decameron*, for detective thrillers or simple Western-cowboy stories. Most readers or movie-goers have similar experiences. It is such observations that cause psychologists to become interested in how people understand and remember simple stories (Bower, 1976, p. 511).

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[1] An aside to the highbrow: What's wrong with this title? (Answer to be provided later in this chapter.)

Why is it that certain prose passages are easy to follow and recall, whereas others are virtually unintelligible? Factors including passage content and topic interest are obviously important and cannot be ignored. Even if such factors are held constant, however, prose passages can still be more or less comprehensible simply as a function of the way in which the author formats, organizes, and/or presents the prose content. The effect of these "presentation" factors on the comprehensibility of text will be discussed here. Of equal, if not more, importance from a practical standpoint is what a learner can do to increase the likelihood that a prose passage will be comprehended and recalled. Possibilities in this domain will be discussed here as well. Thus, we will focus on two general classes of prose-learning strategies: (a) those that authors can use to optimize communication (i.e., prose-dependent strategies; and (b) those that learners can use to optimize reception (i.e., processor-dependent strategies).

The expansive prose-learning literature has been dealt with in several previous reviews, two of the most recent and most thoughtful being those of Gagné (in press) and Reder (1977). There is no need to retrace the same steps here. Rather, we have selected from some of that literature and elsewhere research that we believe has implications for enhancing the prose learning of children. Although our primary focus will be on the middle school years (i.e., on children between ages 9 and 14), selected research findings derived from both older and younger populations will be included. Such findings will be cited chiefly for purposes of developmental comparison and contrast, or because research conducted using children within our targeted age range is lacking.

Why did we choose to focus on the prose learning of children? Our primary consideration was that the work discussed here is to be included in a volume published by the International Reading Association, that deals with children's comprehension skills and comprehension-related curricular materials. Although a veritable plethora of prose-learning strategies have been investigated in adolescent and adult populations (primarily high school and college students), there are obvious cognitive-developmental differences between older and younger students. Because of these differences, we believe it unwise to conclude that strategies found to be effective at one developmental level will be similarly effective at another.

Consider, for example, the strategy of having students focus on topic-related questions while reading a prose passage. This particular strategy has commanded considerable research attention in the last decade, and its potential for enhancing the prose comprehension of older students has been amply detailed (see, for example, Anderson & Biddle, 1975; Frase, 1975; and Rothkopf, 1972). A similar conclusion is not justified from the small amount of question-asking research that has been conducted with children, however. For example, the typical adult finding that questions placed just after a portion of text facilitate students' subsequent recall of prose content (including material not explicitly questioned) has not consistently emerged in studies involving children (e.g., Fischer, 1973; Richmond, 1976; Rowls, 1975; Watts, 1973).

Analogous developmental differences may be found in studies where subject-generated visual imagery constitutes the prose-learning strategy

of interest. Although there is good reason to believe that such a strategy produces prose comprehension gains in children 8 years of age and older (see Levin, 1976; and Pressley, 1977), on the basis of research conducted in our laboratory over the last few years (e.g., Dunham & Levin, 1978; Guttmann, Levin, & Pressley, 1977; Ruch & Levin, 1978), the same cannot be concluded for children younger than this. Thus, we believe that inferences about the effect of various prose-learning strategies must be made with reference to the age range on which the research was based. As far as our present orientation is concerned, one is simply not justified in extrapolating downward or upward to students in the middle school years from studies conducted with older and younger students respectively (see also Levin & Lesgold, in press).

In summary, then, in this chapter we report on strategies that seem to hold promise for facilitating children's prose learning. Our basic emphases may be reiterated in the following two questions:

1. What strategies can be applied by an author or instructor to enhance the comprehensibility and memorability of the information in a prose passage?

2. What strategies can be applied by a child who is reading or listening to the passage in order to accomplish the same thing?

These two questions should sound familiar to those who are acquainted with our previous writings (e.g., Levin, 1972, 1976; Pressley, 1977), inasmuch as they serve to evoke the distinction between what we have called imposed and induced learning strategies. This distinction will provide us with a convenient framework for organizing the present chapter.

## GENERAL FRAMEWORK FOR THE STRATEGIES CONSIDERED

Facilitative prose-learning strategies can be imposed by a communicator (Question 1 above), induced in a processor (Question 2), or both. The "both" implies that such strategies need not be mutually exclusive and, indeed, certain strategies that we will consider contain elements of each. For example, an author may include a summary at the end of a chapter to help the reader consolidate the previously presented information. This would be an imposed strategy or, in the present context, what we earlier referred to as a prose-dependent strategy. On the other hand, a reader may be required to write a brief synopsis of what was just read, summarize it in his or her own words, review mentally the most important information, etc. Such strategies are induced in that they require some kind of relevant cognitive activity generated from within the learner. With these processor-dependent strategies, the onus is on the reader to perform--to give and not just to receive. Finally, as was implied above, certain strategies may be both prose- and processor-dependent. Consider, for example, a prose passage that is followed by short-answer review questions. The questions are prose dependent inasmuch as they are externally provided adjuncts to the written prose and, presumably, they are structured to consolidate in the reader's memory the information previously presented. At the same time, however, review questions are processor dependent since it is clear that whether or not they function as intended depends on the use made of them by the reader. That is, the author's objective in including such questions would obviously be frustrated if the reader did not expend the effort necessary to answer them (correctly).

Many, if not most, prose-learning strategies are both prose- and processor-dependent, and this should be realized at the outset. In our attempt to compartmentalize them, however, we are forced to make some "either-or" decisions about strategies, based on whether a particular strategy appears to us as either predominantly prose dependent or processor dependent. Although we are reluctant to dichotomize strategies in this fashion, by doing so our strategy classifications and discussion become more manageable.

We turn, then, to Table 1 where exemplars of our present emphases are presented. The row labels of course represent the two classes of prose-learning strategies just considered. A second dimension to our framework is afforded by the two column labels. That is, strategy types (prose- or processor-dependent) can be further broken down according to their assumed primary function in a prose-learning context. As will be seen, these functions loosely correspond to the particular point in time that the strategy is applied: prior to, as opposed to during, passage presentation.[2]

We are inclined to view the general class of prose-learning strategies that are activated prior to passage presentation as serving primarily a context- or stage-setting function. That is, they sensitize the student to what the passage is about, what should be learned from it, what existing information the student already possesses concerning the material, and the

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[2]Time-tied classifications of prose-learning adjuncts and activities have been adopted by others as well (e.g., Anderson, in press; Carroll, 1971; Gagné, in press). Moreover, there are effective information-consolidation activities that can be applied following a prose passage, such as review quizzes of various kinds and with various types of information feedback (see, for example, Anderson & Biddle, 1975; and Kulhavy, 1977). Test-taking "strategies" will not be considered here, however, and activities such as summarizing or reviewing a prose passage will be regarded as during-prose strategies for present purposes.

Table 1

Four Classes of Prose-Comprehension Strategy, as Represented by Assumed Primary Function and Type

| Type of Strategy | Primary Function of Strategy: Stage-setting | Primary Function of Strategy: Storage/Retrieval |
|---|---|---|
| Prose Dependent | | |
| Processor Dependent | | |

like. In contrast, prose-learning strategies activated during passage presentation will be regarded as serving an information-storage/retrieval function. Although both strategy types discussed here are, to some extent, concerned with storage and retrieval (and, in particular, with facilitating storage and retrieval), those applied during passage presentation operate on prose information directly and in its presence. Examples include alternative structural and logical text organizations (see Meyer & Stein, in press), the provision of content-clarifying auxiliary materials, and student-generated cognitive elaborations and transformations of passage content.

As mentioned earlier, our general plan in this chapter is to provide the reader with examples of children's prose-comprehension strategies that "seem to succeed." These examples are just that: illustrations and not exhaustive listings.[3] Our presentation of the various examples will now follow from the four cells represented in Table 1.

## EXAMPLES OF SEEMINGLY SUCCESSFUL CHILDREN'S PROSE-COMPREHENSION STRATEGIES

### Stage-setting Strategies

#### Prose-dependent, Stage-setting Strategies

Whether contained in the prose materials or provided by an instructor, our stage-setting strategies encompass the kinds of "preinstructional strategies" recently reviewed by Hartley and Davies (1976). Included are

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[3]The term "illustrations" is used here in both the literal and figurative sense, if the reader will excuse an inverted double pun. "Literal" illustrations will be taken from children's prose-learning studies in which the strategies consist of prose-dependent pictures and processor-dependent visual imagery. On the other hand, "figurative" illustrations will be taken from the same sort of studies, but in which the strategies are nonpictorial-like in nature. We alert the reader that as a consequence of our own experiences (and biases) associated with children's prose-learning research, our emphasis in this chapter will clearly be on the former (literal) type of illustrations.

question answering (pretests), instructional objectives ("goals" and "purposes"), overviews, and Ausubelian "advance organizers" (e.g., Ausubel, 1963). The first two strategies may be regarded as primarily sensitizing or "orienting" (Frase, 1970) in nature, in that they may introduce terms or hint at to-be-learned content and skills, but they do not inform per se. Of course, the hope is that when such sensitizers are combined with the subsequent prose content, learning will be enhanced (possibly as a result of increased attention paid to particular terms and ideas when they are encountered in the text). The success of sensitization strategies, with respect to the specific material sensitized, has been fairly well established with students of all ages. In short, alerting students to exactly what it is they are to learn is generally more effective than "leaving them in the dark"--not very surprising, perhaps, but often overlooked in instructional practice.

The second two of the Hartley and Davies (1976) preinstructional strategies are basically content-clarifying and, therefore, informational in their own right. It is worth mentioning that previous distinctions (and arguments about distinctions) between overviews and advance organizers appear throughout the literature (e.g., Barnes & Clawson, 1975; Lawton & Wanska, 1977), and we do not wish to fuel the fire here. That is, we will not debate what the salient characteristics of a good advance organizer, as conceived by Ausubel, are (e.g., consists of a higher "level of abstraction," provides a needed "ideational scaffolding," etc.), in contrast to those of a good overview. Rather than belabor the issue, we will regard both overviews and organizers as content-clarifying preinstructional

strategies, and use the terms more or less interchangeably. Certainly as far as the prose comprehension of children is concerned, we subscribe to the view that: (a) content-clarifying preinstructional strategies (of whichever type) should be relatively simple and concrete. We further believe that: (b) such simplification or concretization strategies will exhibit their greatest payoffs on prose passages whose content is far from simple or concrete. We will return to both of these points following an illustration of the kind of strategy we have in mind.

Arnold and Brooks (1976). A number of adult studies have demonstrated that prose learning proceeds much more efficiently once an appropriate organizing context has been established (i.e., once the stage has been properly set). Of particular significance to the present discussion, Bransford and Johnson (1973) have found that students' understanding and recall of an otherwise difficult-to-comprehend prose passage was helped considerably by the provision of either a stage-setting visual illustration or a verbal title. Arnold and Brooks sought to replicate and extend the Bransford and Johnson findings using second- and fifth-grade children. What follows is one of the eight short passages created by Arnold and Brooks:

> Jimmy was hanging by his knees and his legs were beginning to ache, but he still hung on. The swan was flying very fast towards Jimmy s home. The wind was blowing through Jimmy's hair and jacket and he was getting cold. The other children were having a good time. Jimmy wished the trip were over. Lisa had fallen asleep on the white feather mattress and Joey was singing a song (Arnold & Brooks, 1976, p. 712).

Although each individual sentence is easily comprehended--even by a child--the passage formed by the collection of sentences is not likely to be--even by an adult. What seems to be missing is a meaningful context, or theme, within which the individual sentences can be embedded.

Just prior to listening to each passage, children in one condition were provided with a theme, in the form of a stage-setting illustration. One such illustration is provided here as Panel A of Figure 1. (How does this information affect your reinterpretation of the above passage?) In a control condition, children were shown a random arrangement of the same elements of the illustration (Panel B of Figure 1) just prior to the presentation of the story. This condition was derived from Bransford and Johnson (1972), and was designed to control for everything except the explicit context in the experimental condition.

If an appropriate context is related to comprehension and recall of a prose passage (as suggested by the adult research), then performance differences between the two conditions would be expected. Based on a subsequent free-recall measure of information derived exclusively from the passage, this was indeed found to be the case for fifth-grade children: Those who received the integrated context recalled almost one-third more passage content than did control students. Thus, the same sort of stage-setting illustrations that improve the prose learning of adults (Bransford & Johnson, 1972) also seem to succeed with children as young as fifth graders. The Arnold and Brooks data do not permit the conclusion that children younger than this will exhibit similar improvements, since in that study the second graders did not appear to benefit from the

A

B

Figure 1. Example of Organized (A) and Control (B) Pictorial Stage-setting Contexts. (Taken from Arnold & Brooks, 1976; copyright 1976 by the American Psychological Association; reprinted by permission.)

preinstructional organizer.[4] This latter finding is but one instance of our introductory caution against making blanket across-age generalizations.

Related remarks. In addition to the two pictorial conditions described in the preceding section, Arnold and Brooks (1976) included two similar (though less specific) purely verbal conditions in their experiment. These consisted of informing students just prior to passage presentation either that the story was about "two boys and a girl riding a swan" (Context) or that it was about "two boys and a girl and a swan" (Control). Based on the passage-recall measure discussed previously, no significant increase in the performance of context students, relative to controls, was apparent at either grade level (the increase was only about 6% among fifth graders). Why should the pictorial organizer be effective and the verbal organizer not, when it comes to recalling passage content? Surely these two organizer types differ in many respects (including the greater specificity of the pictorial organizer, as may be appreciated from a look at Figure 1), but it cannot be denied that the provided illustration affords a very simple, concrete framework for organizing the incoming passage content. As we argued before concerning content-clarifying preinstructional strategies, they should be easy to follow and concrete. One of the best ways to satisfy these criteria is to provide a compact pictorial organizer. Although we

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[4]These conclusions are based on the summary data supplied by Arnold and Brooks (1976), and it is clear that our interpretation of their data differs from their own. Without going into the specifics here, this is due to the fact that Arnold and Brooks' discussion was based primarily on analyses of what we consider to be an inappropriate performance measure. This measure ("inferences") included as correct responses certain information which was not explicitly contained in the passage and which serves unjustifiably to bias the recall data in favor of context-provided students. When one focusses strictly on students' correct recall of passage-derived content, about all that can be said is that fifth graders who are provided with stage-setting illustrations display a significant performance increment relative to appropriate controls.

are not denying the possibility of devising similarly effective verbal organizers, it seems unlikely that even the ultimate "thousand-word" treatise will be "worth" perceptibly more than a compact "one-picture" organizer.

Our second previously stated belief about content-clarifying preinstructional strategies is that they should become particularly effective when the "going gets rough." What this means is that the benefits derived from content-clarifying organizers should be greatest with difficult-to-comprehend passages. "Difficult," as applied here, is only vaguely defined, but is a concept that can be easily operationalized in relative terms. For example, the thematically barren passages of Arnold and Brooks (1976) could be mixed with comparable, though thematically rich, passages and read to students for comprehension-difficulty ratings (see, for example, Bransford & Johnson, 1972). If our speculations about organizer effectiveness are on target, then it should be the case that content-clarifying organizers would be comparatively more beneficial for the subsequent recall of passages rated more difficult to comprehend. An alternative way to evaluate these speculations would be to examine the effectiveness of content-clarifying organizers using prose passages of varying abstractness.

It is fairly well established that learning materials (prose passages included) which deal primarily with abstract referents and events are less well comprehended and recalled in comparison to learning materials focussing on concrete referents and events (e.g., Johnson, Bransford, Nyberg, & Cleary, 1972; Johnson, 1974). (We are using the terms "concrete" and "abstract" in the contemporary psychological sense here to refer to stimuli that are rated as being more and less tangible/visualizable,

respectively [see Paivio, 1971].) Thus, we would predict that content-clarifying organizers would be especially helpful for children in situations where the passage content was relatively abstract. Although little, if any, systematic data bearing directly on this prediction seem to be available, a few studies based on adults lend indirect support to it (see, for example, Davidson, 1976; and Royer & Cable, 1976). In these studies students' comprehension of very abstract prose passages was helped by instructor-provided concrete organizers.

Processor-dependent, Stage-setting Strategies

We turn now to the second of our stage-setting strategies as represented in Table 1. Here, organizing information relevant to the upcoming passage must be called into play by the prose processor him- or herself. The most usual application of this strategy, then, is for a student to relate what (s)he anticipates the passage will be about to what (s)he already knows. In a phrase, relevant "knowledge of the world" is activated by the student in order to comprehend better (or even at all) the to-be-learned prose material.

Consider, as a simple analogical manifestation of this kind of strategy, the outstanding television game show, "The $20,000 Pyramid," which we watch regularly to get ideas about comprehension, communication, and how people think. In the first segment of each contest, the player must identify category members when given clues about those members by his or her partner. For example, suppose the category were "French things" and one's partner were to say: "A very tall structure, trademark of Paris, built for a World Fair." (Of course the answer desired is Eiffel Tower.) During the time allotted for a given game (30 seconds), a contestant must identify seven different exemplars from a given category (e.g.,

seven different "French things"). Thus, time is at a premium. It turns out that a very good (and very obvious) pregame, stage-setting strategy that contestants can employ is to focus their attention on the particular category, and to start activating their existing knowledge structures within that category in order to anticipate exemplars that might be requested. What follows is a strategic contestant's plausible self-dialogue (exaggerated, of course, since only a few seconds of preparation time are allowed):

> Now let's see, the category is "French things." What do I know that's French? Food things (a popular first choice): French fries, French onion soup, vichyssoise, maitre d', cabernet sauvignon, escargots, quiche lorraine, Cuisinart. What else around here? Renaults, French poodles, Brigitte Bardot, Truffaut, Jacques Cousteau, Jean Claude Killy, the French Alps. What about in France? The River Seine, Paris, Arc of Triumph, Eiffel Tower, Notre Dame, The Louvre, Toulouse Lautrec, impressionism. What else? Napoleon Bonaparte, Joan of Arc, ... , OK, let's go.

A similar type of strategic anticipation can come into play when processing text and, to paraphrase a familiar saying: What one brings into a prose passage often determines what one will take out of it. (Just take a crack at *Finnegans Wake*, for example--see also Footnote 1.) However, the processor-dependent, stage-setting strategy cell of Table 1 is a maverick of sorts. Frankly, it was born purely out of "slot-filling" necessity in order to provide some (literal) balance to our prose-compre-

hension framework.[5] We will now attempt to explain why we view this particular cell as a forced entry, but a forced entry that is important to consider when discussing prose-learning strategies.

First, it is often the case with prose that no stage-setting clues are provided concerning passage/topic content, and even when they are they may be too vague (for a student to operate on them effectively) or unhelpful (if the stage-setting clues do not trigger off the student's pre-existing related knowledge). Second, and partly because the above, the stage-setting strategies applied by a processor are bound to be much less purposive (i.e., applied with less intention) than is connoted by our use of the term "strategy" throughout this chapter. Thus, we apply the term "strategy" to the processor-dependent, stage-setting cell of Table 1 with some reluctance.[6]

A few preliminary remarks are in order. There is ample theoretical discussion, and corroborative empirical evidence, relevant to the notion that one's prior knowledge predicts one's perception, comprehension, and recall of "new" information (see, for example, the Anderson et al., 1977, volume cited in Footnote 5). Brief mention of an interesting

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[5]"Slot filling" is a term purposely borrowed from schema theory since that best elucidates the nature of the processor-dependent, stage-setting strategy cell. Anderson, Spiro, and Montague's (1977) volume is devoted to schema theory and is highly recommended. Not only is the theory's basis clearly articulated throughout, but specific educational implications of the theory follow directly from much of the work reported there (see also Baker & Stein, in press).

[6]On the other hand, there are reading authorities who explicitly advocate the use of processor-dependent, stage-setting strategies. For instance, in reviewing texts on how to teach reading, we found numerous recommendations that teachers ought to prompt children to apply what they already know in order to improve their comprehension of upcoming text (e.g., Dechant, 1970; Spache & Spache, 1977; Stauffer, 1969; and Zintz, 1970). When viewed from this perspective, the term "strategy" might not be as ill-suited to our processor-dependent, stage-setting cell as one might think.

recent study by Gordon, Hansen, and Pearson (1978) will suffice to make the point here. These authors found that young (second-grade) children who had some prior knowledge about a given topic ("spiders") learned more from those portions of a "spider" passage where that prior knowledge could be applied, relative to children who had little or no prior "spider" knowledge. In contrast, for information explicitly stated in the passage and for which no prior "spider" knowledge was necessary, the two groups of children did not differ significantly with respect to amount learned.

As far as processor-dependent strategies are concerned, it is easy to make a mockery of the prior-knowledge-predicts-present-learning principle: Simply provide students with as much background knowledge as possible--everything they ever needed to know about a given topic, to borrow from Ed McMahon's "Tonight Show" routine--before giving them additional related material to learn (Levin, 1978). But surely the less extreme recommendation that follows from the principle is not so ridiculous: Simply provide students with as much background knowledge as is necessary to facilitate comprehension of the to-be-learned material. This less extreme prescription has in fact been proffered to reading practitioners (e.g., Betts, 1957, p. 494), and is well illustrated, we believe, in an experiment reported by Brown, Smiley, Day, Townsend, & Lawton (1977, Experiment 2).

Brown et al. (1977). In this experiment, second, fourth, and sixth graders were asked to listen to a passage about a hunter from the fictitious "Targa" tribe. Although certain details of the passage were left unspecified, the passage itself was perfectly comprehensible in its presented form (unlike that of Arnold & Brooks, 1976). However, in an attempt to influence students' interpretation of the passage, Brown et al. manipulated the children's background knowledge of the Targa the week before the

passage was actually presented. One group of children was informed that Targas were of the peaceful Eskimo variety, and details (both pictorial and verbal) such as snow-related settings, polar wildlife, and all the "trappings" were provided for students to embellish this orientation. A second group of children was given a warring Indian orientation, along with burning deserts, water and animal shortages, etc. A third (control) group was given information about Spanish people the week before, which was of course irrelevant to the ensuing Targa-target passage. (For further description of this experiment, see Baker & Stein, in press).

Two findings are of particular note. First, the two groups with pre-established background knowledge about the Targa recalled over 25% more passage content than controls. Second, convincing evidence was provided to show that the different kinds of relevant background information (Eskimo vs. Indian) did influence students' processing of the passage. In particular, the recall errors that were made were consistent with children's pre-established backgrounds: About two-thirds of all recall errors consisted of appropriate background information that was <u>not</u> in fact mentioned in the passage; that is, Eskimo-oriented students "recalled" Eskimo-related information that was not there, whereas as unmentioned Indian-related background information was "recalled" by Indian-oriented students. The same pattern was apparent in some follow-up questions designed to determine whether or not specific background information did in fact influence the children's interpretation of the passage.

<u>Related remarks</u>. Gordon et al.'s (1978) research has demonstrated that young children's existing knowledge about a particular topic may determine what and how much they will learn from a prose passage con-

taining new topic-related information. From a methodological standpoint this is important inasmuch as it highlights the claims of others (e.g., Levin & Lesgold, in press; Royer & Cunningham, 1978) that if one is interested in assessing strictly what a student has learned from a prose passage, then what the student already knows--or what (s)he can deduce without even reading the passage--must first be taken into account. From a substantive standpoint the finding suggests that if relevant knowledge structures are well established, learning will proceed more efficiently. Brown et al.'s (1977, Experiment 2) experimental demonstration is in accord with this position, as is a study with adults reported by Davidson (1976). The Davidson study will be described here in some detail since it is a good example of how prior knowledge can make comprehensible otherwise very difficult-to-comprehend material.

Davidson selected "The Mat Maker" chapter from Melville's Moby Dick as the to-be-learned prose content. Given our earlier comments about stage-setting strategies likely being more helpful for comparatively difficult and/or abstract passages, "The Mat Maker" certainly is a prime candidate for facilitation. As the reader may recall from his or her own experiences with this passage, a number of abstract concepts (such as fate, chance, and free will) are interrelated, to each other as well as metaphorically to various concrete parts of a loom (such as the warp, the woof, and the shuttle). It goes without saying--but will be said anyway--that one's background familarity with looms should predict how well Melville's analogies should "work" (as with the Gordon et al., 1978, "spider" study).

Realizing this, and by selecting learners with presumably "loomless" backgrounds (in contrast to, say, weavers--see Anderson, Reynolds,

Schallert, & Goetz, 1977, for an interesting variation on this theme), Davidson attempted to fill in the needed "loom" network by preinstructing one group of students as to the nature of the loom and its working parts. Both pictures and verbal descriptions were used in this loom-knowledge phase.

On the subsequent passage, Davidson found that the students with built-up loom backgrounds outperformed two groups of control students on a true-false assertion test. Compared to the two control groups combined, loom-knowledge students correctly identified almost 50% more items. In addition, qualitative analyses of free-recall protocols of the students revealed quite different structurings of passage information in the loom-knowledge and control conditions. Loom-knowledge students were found to be much more likely to relate abstract concepts from the passage to concrete loom parts, relative to control students who tended to maintain separate abstract and concrete concept clusters.

In reviewing the literature on content-clarifying strategies in the stage-setting domain (e.g., Arnold & Brooks, 1976; Brown et al., 1977; Davidson, 1976), the present authors have come to believe in the utility of such strategies--but within limits. A few of these limits were specified earlier. For example, it appears that organizers and background knowledge facilitate students' comprehension of difficult-to-comprehend (abstract, unfamiliar, or ambiguous) material. This is intuitively pleasing and seems to have modest empirical support. After all, why <u>should</u> stage-setting information be needed if the upcoming passage is concrete, familiar, and straightforward? At the same time, it is reasonable to suppose that <u>extremely</u> difficult-to-comprehend passages (and/or organizers) would diminish stage-setting effects. Moreover, this supposition may be of

special importance when the students are cognitively less advanced, as evidenced by reported facilitation breakdowns when elementary school children have been presented with preinstructional organizers for difficult passages (e.g., the second graders of Arnold & Brooks, 1976; Hawkins, 1971).

## Storage/Retrieval Strategies

As was mentioned in the introduction, storage/retrieval strategies (as we have defined them) encompass the class of adjuncts and information-processing activities that can be brought into play during passage presentation (i.e., in the company of the to-be-learned text). Our initial reference to Bower's (1976) introspective excursions with Chaucer in contrast to James Joyce could serve as a testimony to the very different perceived means by which a text's structure and/or content can be organized. Baker and Stein (in press) and Shimmerlik (1978) provide recent reviews of relevant passage-organization variables, and these will not be duplicated here. Suffice it to say that: (a) better-organized prose passages are generally better learned as well; and (b) how a passage is organized generally determines what prose content a student will learn and how (s)he will organize that content. In this section we consider illustrative strategies that seem to render a given prose content and/or structure more memorable for children.

### Prose-dependent, Storage/Retrieval Strategies

Apart from providing an efficient structuring of the prose content that is there, a communicator can alter or add to the form in which that content is presented. Altering the form of a prose passage includes typographical/formatting changes (e.g., Frase, 1977) and modality/media alternatives to <u>reading</u> per se, such as listening to a live lecture or a

tape, watching a movie or dramatization, and various multimedia explorations (see, for example, almost any issue of the AV Communication Review over the last several years). Adding to a prose passage's form includes communicator-inserted aids designed to facilitate storage and retrieval of the prose content, such as the use of topic sentences, appropriate headings and emphases, and marginal comments (e.g., Browning, 1976; Dee-Lucas & Di Vesta, 1978; Doctorow, Wittrock, & Marks, 1978; Wilkie, 1978).

A personal trilogy (1977-78). We wish to include as a (literal) illustration of a prose-dependent storage/retrieval strategy one that definitely seems to succeed with children (and, for that matter, with adults as well). This is the strategy of inserting visual illustrations (pictures) into a prose passage to convey the essence of the content (for recent reviews documenting the success of this strategy, see Levin & Lesgold, in press; Pressley, 1977; and Schallert, in press). The "personal trilogy" aspect of this illustration comes from the fact that we will cite three recent studies from our own laboratory which adequately represent the strategy (Bender & Levin, 1978; Guttmann et al., 1977; and Ruch & Levin, 1977).

In each of these studies, children were read 10- to 20-sentence narrative passages, either in the company or absence of content-capturing colored line drawings. Each sentence of the passage had its own associated picture that was displayed while the sentence was read. Following passage presentation, the children were asked a series of short-answer ("Wh") questions, constructed so as to be highly "passage dependent" (Tuinman, 1973-74). By this is meant that it was very unlikely that students could respond correctly to the questions without having first been exposed to

the passage. Thus, we can be quite certain that the data from these studies represent learning from text, rather than pure prior knowledge of the world or test-wiseness.

To make the preceding comments more concrete, consider the initial sentence from one of the passages (Guttmann et al., 1977): One evening Sue's family sat down to eat a big turkey for dinner. The picture accompanying this sentence is shown as Panel A of Figure 2, and a question related to the content is: What did Sue's family eat for dinner one evening? It can be stated that the correct answer, turkey, is not likely to be supplied by students who are asked the question without them first having heard the passage, since sentences and questions were constructed on the basis of just such "norming" information. That is, students who are asked to provide a reasonable answer to this question out of context typically respond with hamburgers, hotdogs, or soup. Nonetheless, whether or not students who heard the passage and correctly answered the question actually comprehended what they heard is a matter we will consider shortly.

The basic datum of present interest is that in each of these studies, children who heard the story in the company of pictures recalled substantially more prose information in comparison to children who simply heard the story without pictures. In the Guttmann et al. (1977) study, kindergartners, first graders, and third graders experienced gains due to pictures of about 43%, 36%, and 39%, respectively. From these figures, it can be seen that the intuitive notion that pictures are likely to be relatively more helpful for younger children than for older children is not supported, since the facilitation percentages are comparable at all grade levels (see Levin's, 1976, discussion related to picture effects in general).

A

B

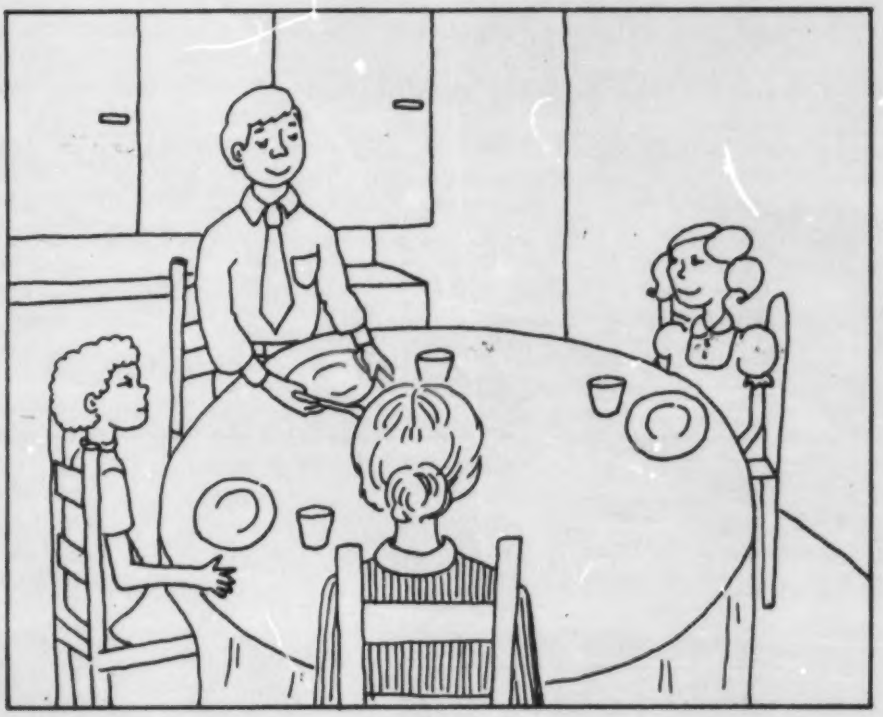

Figure 2. Examples of Complete (A) and Partial (B) Pictures.

In the Bender and Levin (in press) study using a longer passage, third graders increased their recall by over 25% when pictures were provided; and for the main target group of that study--educable mental retardates between ages 10 and 16--the increase was 89%! Clearly, performance gains of this magnitude cannot be regarded as trivial.

These studies appear to be significant in at least two other respects. First, it will be noted from Panel A of Figure 2 that the information asked for in the question (i.e., turkey) is physically present in the picture. In contrast, because of their interest in visual imagery and its presumed development in prose-learning situations, Guttmann et al. (1977) and Ruch and Levin (1977) fashioned illustrated contexts ("partial pictures") in which the to-be-supplied information was strongly suggested by, though not physically present in, the provided picture. (See, for example, Panel B of Figure 2, where a perspective-blocking tactic was adopted.) Students who were presented these partial pictures were told to use what was displayed in the picture to help them construct an image of what was not displayed. As was previously noted for text-embedded questions, such a strategy can be seen to involve both prose-dependent elements (here, author-illustrated contexts) and processor-dependent elements (listener-imagined content). In the case of partial pictures it is assumed that the pictorial contexts "prompt" (Rohwer, 1973) the appropriate visual imagery. Interestingly for present purposes, partial pictures were found to increase children's prose recall (by about 30%). As far as prose-dependent strategies per se are concerned, the important point

is that even less-than-complete pictures (if appropriately constructed)[7] can function as effective children's prose-learning aids (see also Riding & Shore, 1974).

The second significant aspect of the studies being considered here is some evidence provided concerning the nature of information processing associated with communicator-provided pictures. It has been argued previously that short-answer questions should consist of paraphrases of the original passage content in order to increase one's chances of measuring comprehension rather than simple rote recall (Anderson, 1972). Thus, in contrast to the earlier given verbatim question about what Sue and her family were eating for dinner, a paraphrase question could be stated as: What food was served at the girl's house at suppertime? Consistent with theoretical notions about the verbatim-paraphrase distinction, it has been found that simple rote repetition of passage content is sufficient to produce facilitated performance on verbatim-worded questions (e.g., Blank & Frank, 1971; Levin, Bender, & Lesgold, 1976). On the other hand, provided pictures and partial pictures have been found to facilitate performance with both verbatim and paraphrase questions (Bender & Levin, in press; Levin et al., 1976; Peng & Levin, 1977; Ruch & Levin, 1977). In the Levin et al. (1976) study, for example, pictures were superior to simple repetition for first graders' performance on verbatim questions; in the Ruch and Levin (1977) study, partial pictures improved the performance of third graders on both

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[7]This "appropriately constructed" proviso was motivated by the failure of other studies to detect positive effects due to pictures. The studies can be characterized by their use of pictures that were either irrelevant or only weakly related to the essential prose content, however (see Levin & Lesgold, in press).

verbatim and paraphrase questions, whereas simple repetition was effective only for the former (presumed less comprehension-demanding) question variation; and in the Bender and Levin (in press) study, pictures facilitated retardates' performance again on both question variations, whereas simple repetition did not facilitate performance on either type. Such findings are important insofar as they lend support to the argument that pictures do more than simple repetition in the way of promoting increased comprehension of prose content. (See Levin and Lesgold, in press, for additional comments about what pictures in prose can and cannot be expected to accomplish.)

Processor-dependent, Storage/Retrieval Strategies

The final cell of Table 1 is the one in which there is ongoing activity on the part of the prose processor to store the passage information in a manner that is effective for subsequent retrieval. Based on a review of the relevant empirical literature, it seems safe to conclude that the kind of activities likely to be successful prose-comprehension strategies are those which require personal "cognitive constructions." Although cognitive constructions have been variously referred to by others in the past, we take these to include those mental operations of a processor that are aimed at (re)organizing and/or elaborating upon the prose content. Strategies such as constructing imaginal representations of textual information, responding to questions that require comprehension-level processing of the prose content, and generating paraphrases of the information just processed have all been identified as effective strategies with children (e.g., Doctorow et al., 1978; Guttmann et al., 1977; Yost, Avila, & Vexler, 1977). Other cognitive-

constructive activity such as underlining of perceived important content and note taking could also be considered, but they are neither well-established successes nor well-studied with children (e.g., Anderson, in press; Brown & Smiley, 1977; Browning, 1976).[8] Let us consider here an example of a processor-dependent, storage/retrieval strategy that has been applied by elementary school children to yield handsome reading comprehension returns.

Doctorow et al. (1978). In this study, sixth-grade students were given fairly complex passages to read (high and low readers were given different passages, appropriate for their reading level). Included in the several experimental conditions were two of concern for present purposes. Students in a paraphrase condition were required to write a sentence summarizing the content of each paragraph as they read it. It was thought that this type of activity would induce students to process the story information with greater comprehension in comparison to control students who were exposed to the passage for the same amount of time but with no paraphrasing instructions. A commendable feature of this experiment that should be highlighted is the equivalent amount of passage exposure time across treatment conditions. As a result, performance differences between conditions cannot be attributed to time and/or content repetition differences per se, as has been argued for other adjunct-to-text experiments (e.g., Ladas, 1973; Levin & Lesgold, in press).

It was found that constructing paragraph paraphrases was an eminently manageable task for children of this age since they could do so about

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[8]The reader activities of previewing (skimming) and reviewing relevant portions of text could be included here as well.

80% of the time (no content analysis of the "quality" of the paraphrase was provided, however). Moreover, consistent with the hypothesized comprehension-inducing character of this activity, paraphrase students outperformed controls on both an immediate multiple-choice test and a delayed (by one week) modified cloze test. This was true for both high and low reading groups. Averaged across reading groups (and thus, across passages) paraphrasing increased students' performance by over 50% on both tests.

Related remarks. Recent work with high school and college students supports the notion that paraphrasing (e.g., Pio & Andre, 1977) and other forms of cognitive-constructive activity (e.g., Dee-Lucas & DiVesta, 1978; Shimmerlik & Nolan, 1976) are effective prose-learning strategies. Included here is the activity of responding to text-embedded questions while reading. Given our obvious affinity for pictorial comprehension aids, an interesting study is that of Snowman and Cunningham (1975) in which it was found that both student-generated verbal responses and student-generated line drawings (in response to communicator-provided questions) functioned effectively and equally to improve performance.

With younger students (7th graders), Yost et al. (1977) found that a question is not a question is not a question. Consistent with what could have been anticipated from the earlier sentence-learning findings of Watts and Anderson (1971), as well as the levels-of-processing framework of Craik and Lockhart (1972), these authors demonstrated that questions prompting more elaborate cognitive constructions on the part of the student (i.e., questions whose answers required greater integration and synthesis of text content) produced greater learning gains in comparison to questions

prompting simpler cognitive constructions. Students responding to higher-level questions also expended more time, however, which must be considered when interpreting the Yost et al. results.

Finally, a study by Brown and Smiley (1977) serves to illustrate an important chicken-and-egg problem that must frequently be wrestled with by researchers in this domain. Potentially effective prose-learning strategies are often discovered either on the basis of a researcher's intuition or from introspective reports supplied by effective prose learners (e.g., college students and precocious children). For example, in one of their experiments with fifth-, seventh-, and eighth-grade students Brown and Smiley found that the most proficient prose learners were those who elected spontaneously to take notes and/or underline while they were reading. It might therefore be predicted that if less proficient prose learners were instructed to engage in the same kind of cognitive-constructive activity, their prose-learning performance would exhibit an increase. Instructing students to generate visual images to represent the content of concrete narrative passages has proven successful in this regard (see, for example, Levin, 1972, 1976; and Pressley, 1977). In the Brown and Smiley experiment, however, the less proficient prose learners did <u>not</u> benefit from a preinstructional suggestion to take notes and/or underline. This is not surprising given that such students were found to produce notes and underlinings of inferior quality. Thus, the experiment helps to make the point that simply instructing a less proficient prose learner to adopt a strategy spontaneously applied by a more proficient prose learner will not always be sufficient to effect a comprehension increase. In fairness to note taking and underlining, however, it should be mentioned

that in the Brown and Smiley experiment no explicit instruction was provided concerning how to take notes and underline effectively. Indeed, the request for students to apply the strategies was given as little more than a hint that it would be permissible for them to do so.

## REFLECTIONS ON RESEARCH INTO CHILDREN'S PROSE-COMPREHENSION STRATEGIES

We conclude this chapter by reflecting on a couple of general feelings that were evoked during the course of our perusal of the children's prose-learning literature. One general feeling we had was that a vast number of prose-processing activities have the potential to be effective strategies for children. Whether or not a particular strategy realizes its potential, however, depends on a host of situational factors. These factors include both prose characteristics (e.g., difficulty and concreteness, as discussed earlier in this chapter) and processor characteristics (e.g., the student's cognitive-developmental level). Unfortunately, however, researchers typically select the specific prose passages and students for their experiments on the basis of convenience rather than on the basis of substantive or theoretical considerations. An informed guess is that the mixed results and nonreplications that crop up in the prose-learning literature may be traced to just such unconsidered choices.

For these reasons we believe that quests for the single "best" prose-learning strategy are not likely to be productive. Because of the situational constraints alluded to above, it is not at all surprising that one researcher's "champ" turns out to be another's "chump" as far as effective prose-learning strategies go. We want to reiterate our earlier comments (including Footnote 2) that we have not exhaustively surveyed the many prose-learning strategies that have been studied by educational researchers. In particular, we are well aware that other researchers believe in "champs" that differ from those included here (e.g., the Ausubelians and the many researchers in the Rothkopf, 1970, "mathemagenics"

tradition). We regret that we were unable to give their candidates more attention in this chapter. Nonetheless, we are convinced that the strategies illustrated here will prove to be important educationally.

Another general feeling we walked away from the literature with was that there is tremendous variability in the apparent effectiveness of strategy implementation from one study to the next. By this is meant that one must pay close attention to the thoughtfulness and thoroughness with which a particular strategy is administered in any particular study. To say that a "paraphrase" or "note-taking" strategy was employed by so and so et al. is simply not sufficient. Attention to implementation details is mandatory. In the case of prose-dependent strategies, one should ask how crudely or how elaborately they were represented, and whether in fact they conveyed what they purported to convey. (We are reminded here of the Arnold and Brooks, 1976, verbal organizer, among others.) In the case of processor-dependent strategies, one should ask what and how much systematic instruction (including practice and examples) was provided for students prior to allowing them to launch out on their own. (We are reminded here of the Brown and Smiley, 1977, hint to take notes and/or underline, among others.) As has been argued previously in the context of evaluating innovative educational programs, one must be careful not to confuse the issue of whether a program "worked" with whether it was implemented as intended. Obviously, failure of the latter would preclude success of the former.

In this sense, it must also be realized that prose-learning strategies of the processor variety are surely not going to fulfill their promise unless a fair amount of dedication and old-fashioned hard work are

invested by the student who is employing them. For example, the few attempts to provide children with extended instruction in the use of a visual imagery strategy have not yielded overly impressive returns (e.g., Pressley, 1976), especially when the children are transferred to slightly different contexts (e.g., Lesgold, McCormick, & Golinkoff, 1975; Triplett, 1978).[9] Although we remain hopeful that training programs designed to improve children's prose learning will constitute a viable (and perhaps even vital) prescription for many children and other inefficient prose processors, what must be considered more carefully are the boundary conditions associated with a particular strategy's effectiveness. The questions of when and with whom any given strategy will be effective are terribly important ones. We have alluded to numerous likely boundary conditions throughout this chapter.

In the final analysis, potentially effective prose-learning strategies require clever delivery on the part of an instructor (including the matching of strategies to materials and students), and conscientious application of the selected strategy on the part of the student. Only then will the pain of learning bring about the joy of having learned.

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[9]The multiple-strategy approaches of Dansereau and his colleagues (e.g., Dansereau, Collins, McDonald, Diekhoff, Garland, & Holley, 1978) and of Weinstein and her colleagues (e.g., Weinstein, 1978) with older students may ultimately prove successful, but systematic data on which to evaluate them are presently either unavailable or compromised by inadequate controls. Similar comments apply to other multicomponent reading comprehension strategies, such as SQ3R (e.g., Robinson, 1961).

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